

# Nanocrystalline Mg-Doped Zinc Oxide Scintillator for UV Detectors, Phase I

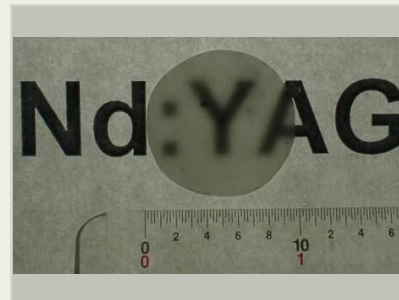
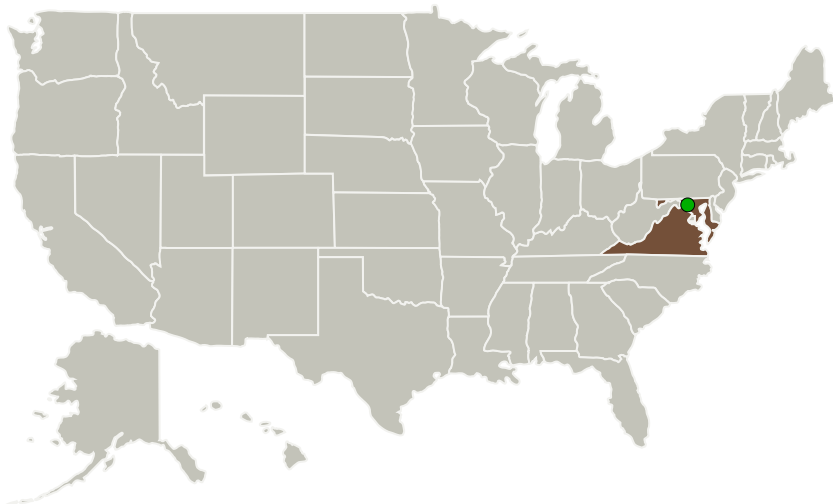
Completed Technology Project (2014 - 2014)



## Project Introduction

NASA uses detectors for a broad range of wavelengths from UV to gamma for applications in astrophysics, earth science, heliophysics, and planetary science. Mg-doped ZnO exhibits room temperature, sub-nanosecond luminescence making it promising for use as a scintillator for UV detectors. The realization of the potential of Mg-doped ZnO as a scintillator is currently hampered by the relatively poor light yield and a unavailability of large single crystals with suitable scintillation characteristics. Growing large single-crystal boules having uniform activator concentration coupled with uniform optical quality are a major setback for single crystal technology. MMI proposes to develop a process for the fabrication of polycrystalline nanostructured Mg-doped ZnO scintillators. A solution based process will be used to synthesize Mg-doped ZnO nanocrystals, which will be compacted to high density using MMI's proprietary plasma pressure compaction process. The scintillation properties vis-à-vis morphology will be analyzed and the process will be optimized for further scale-up and integration to UV detectors.

## Primary U.S. Work Locations and Key Partners



Nanocrystalline Mg-doped Zinc Oxide Scintillator for UV detectors Project Image

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Organizations Performing Work	Role	Type	Location
Materials Modification, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Fairfax, Virginia
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

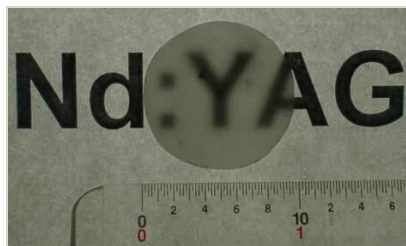
Primary U.S. Work Locations	
Maryland	Virginia

## Project Transitions

**June 2014:** Project Start**December 2014:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/137493>)

## Images

**Project Image**

Nanocrystalline Mg-doped Zinc Oxide Scintillator for UV detectors  
Project Image

(<https://techport.nasa.gov/image/130282>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Materials Modification, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

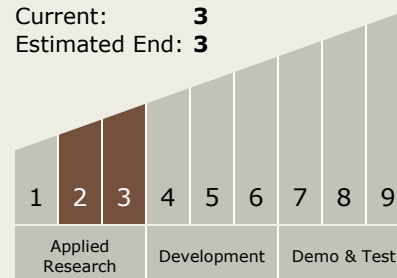
Carlos Torrez

**Principal Investigator:**

Tirumalai S Sudarshan

## Technology Maturity (TRL)

Start: 2  
Current: 3  
Estimated End: 3



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## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
    - └ TX08.1.1 Detectors and Focal Planes

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System